Claims:

1. A system for use in the continuous monitoring of the structural integrity of a structure, said system including at least:

an elastomeric sensor pad having a first structure engaging surface and an opposite surface, said first structure engaging surface provided with a set of at least one first channels which, when said first structure engaging surface is sealingly engaged with said structure, form a corresponding set of at least one first cavities;

first fluid communication means for providing fluid communication between said set of at least one first channels and a constant vacuum source; and

isolation means for isolating each of said first cavities from fluid communication with said constant vacuum source.

2 A system according to claim 1 further including means for monitoring for a variation in the vacuum condition between the constant vacuum source and said first cavities.

3. A system according to claim 1 wherein said sensor pad further includes:

a set of at least one second channels formed on said first structure engaging surface which, when said first surface is sealingly engaged with said structure, form a corresponding set of at least one second cavities;

said second channels intersperse with said first channels; and,

a second fluid communication means for providing fluid communication between said second cavities and an atmosphere or environment at a pressure different to said constant vacuum source.

4 A system according to claim 1 wherein said first communication means includes a third channel provided in said first surface, said third channel being in fluid communication with each of said first channels and with said constant vacuum source.

5 A system according to claim 1 wherein said first fluid communication means includes a plurality of conduits, one of each providing fluid communication between

respective first channels and the constant vacuum source.

6 A system according to claim 3 wherein said second communication means includes a fourth channel provided in the first surface, said fourth channel being in fluid communication with each of said second channels and said atmosphere or environment.

7 A system according to claim 3 wherein said second fluid communication means comprises an opening in each of said second channels that provides fluid communication through the pad to said atmosphere environment.

8 A system according to claim 3 wherein said sensor pad is transparent or at least translucent.

9 A system according to claim 7 further including a supply of a dye indicating liquid in fluid communication with said second channels to provide a visual indication of the location of a flaw.

10 A system according to claim 3 wherein said isolation means includes means for applying force to said pad at respective locations above each or selected ones of said first and/or second channels, to seal said first and/or second channels against the structure and fluidly isolate said first and/or second cavities from said vacuum source.

11 A system according to claim 1 wherein said isolating means is adapted to individually and/or sequentially isolate said cavities so that progressively all of said cavities are isolated from said vacuum source.

12 A system according to claim 1 wherein said isolating means is programmable so that the sequence of isolating said cavities can be varied.

13 A system according to claim 10 wherein said means for applying force includes a plurality of actuators supported on or in said pad above each of said channels for applying force to sealingly deform said channels against the structure.

14 A system according to claim 1 wherein said first communication means includes a duct formed on said opposite surface and respective holes formed in said pad providing fluid communication between said first channels and said duct, and said isolation means includes means for applying a fluid isolation force at respective locations to obstruct said duct, to fluidly isolate selected ones of said first channels from said vacuum source.

15 A system according to claim 14 wherein said means for applying a fluid isolation force includes a pair of minuscule pinch rollers disposed on opposite sides of said duct for sealing a length of said duct from said vacuum source to progressively isolate said first channels in communication with said length from said vacuum source.

16 A system according to claim 14 wherein said means for applying a fluid isolation force includes a moveable seal disposed in said duct for sealing a length of said duct from said vacuum source and means for moving said seal along said duct to progressively fluidly isolate said first channels in communication with said length of said duct from said vacuum source.

17 A method for continuously monitoring the integrity of a structure, said method including at least the steps of:

providing a sensor pad having a first structure engaging surface and opposite surface, the first surface provided with a set of at least one first channels;

sealingly engaging said first surface of the sensor pad with the structure so that said channels together with the structure form a corresponding set of first cavities;

coupling said first cavities to a constant vacuum source;

monitoring for a change in vacuum condition between said cavities and said constant vacuum source; and

Isolating each of said first cavities from said constant vacuum source.

18 A method according to claim 17 wherein the step of isolating each of said first cavities includes venting said first cavities to the atmosphere or surrounding

environment.

19. A method for continuously monitoring the integrity of a structure, said method including at least the steps of:

providing a sensor pad having a first structure engaging surface and an opposite surface, the first surface provided with a set of at least first channels and a set of at least one second channels, said first channels isolated from and interspersed with said second channels;

sealingly engaging said first surface of the sensor pad to the structure so that said channels together with the structure form a corresponding set of first and second cavities;

coupling said first cavities to a constant vacuum source;

coupling said second cavities to an atmosphere or environment at a different pressure or vacuum condition to said constant vacuum source;

monitoring for a change the vacuum condition between said first cavities and said vacuum source; and

isolating each of said first cavities from said constant vacuum source.

20 A method according to claim 19 wherein said step of isolating said cavities includes individually and sequentially isolating said cavities so that progressively all of said cavities are isolated from said vacuum source.

21 A method according to claim 19 further including forming said pad of a transparent or translucent material.

22. A method according to claim 21 further including the step of placing a supply of a dye indicating liquid in fluid communication with said second channels to provide a visual indication of the location of a flaw.